THE EFFECTIVENESS OF EDUCATIONAL PROGRAMS TO HELP PREVENT SCHOOL-AGE YOUTH FROM CONTRACTING HIV: A REVIEW OF RELEVANT RESEARCH

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Introduction

AIDS and School-Age Youth

Very few school-age youth have AIDS. In fact, by September 1987 only 169 U.S. teenagers had been diagnosed with Acquired Immunodeficiency Syndrome (AIDS) (US DHHS, CDC, 1987).

However, this is an overly optimistic picture, and school-age youth represent an important group in the prevention of AIDS for several reasons. First, about one-fifth of all people with AIDS are in their twenties (US DHHS, CDC, 1987), and undoubtedly some of them contracted human immunodeficiency virus (HIV) while teenagers.

Second, much of what teenagers learn and do as adolescents will affect their sexual behaviors and other risk-taking behaviors in later years when they may be more exposed to the HIV virus. Risk-taking habits, like other habits, are sometimes difficult to change.

Third, many teenagers engage in sexual risk-taking behaviors that can transmit the HIV virus. According to data from the National Longitudinal Survey of Youth, 78% of males and 63% of females have sex while teenagers (i.e., prior to their twentieth birthday) (Hofferth and Hayes, 1987). Most teenagers do not have sex until they are age 16 or 17, but in some communities the average age of first intercourse is age 12 (Clark, Zabin, and Hardy, 1984). According to data from the National Survey of Family Growth, of those females that do have sex, 33% of 15 to 17 year olds and 46% of 18 to 19 year olds claim they have sex once a week or more (Hofferth and Hayes, 1987). Of 15 to 19 year old females, 49% had engaged in intercourse with only one partner, 35% with two or three partners, and 19% with four or more partners

(Zelnik, 1983). Finally, of these teenagers, slightly less than half used any method of birth control at first intercourse, and less than a quarter used a condom at first intercourse (Pratt et al., 1984). Similarly, only 22% of them were using condoms as their method of birth control at last intercourse (Bachrach and Mosher, 1982). It is also estimated that about 125,000 to 200,000 teenage men and women become involved in prostitution each year (Loken, 1987). As a result of all this sexual activity, about one in seven teenagers contracts a sexually transmitted disease annually (Quackenbush, 1987).

Fourth, some teenagers use intravenous drugs and can thereby contract the HIV virus. In a 1986 study conducted for National Institute on Drug Use, 1.1% of U.S. high school seniors reported that they had used heroin (Bachman et al., 1987).

Consequently, the risk of getting and transmitting the HIV virus may increase substantially in the future, especially in higher risk communities, where the prevalence of the HIV virus is already more widespread, where there is more IV drug use, and where sexually intercourse is initiated earlier, is more frequent, is not protected by condoms, and is experienced with more partners.

In response to the growing threat of AIDS, there have been efforts at the national, state, and local levels to develop AIDS educational programs. The Centers for Disease Control has launched a major effort to promote the development of AIDS education. Moreover, by March 1988, eighteen states had passed legislation requiring AIDS education in schools. In additional states, legislation is pending and curricula are being developed. According to a survey by the National Center for Health Statistics, 65% of parents report that their 10 to 17 year old children have already had some instruction in

AIDS. However, both because AIDS education is relatively new, and also because programs are currently being developed throughout the country, these figures may change rapidly, and there is little solid research on what is actually being taught, at what grade level, and to how many students.

Overview of This Paper

This paper reviews the research on AIDS and sex education programs. It examines the more significant studies that have evaluated the actual impact of those programs upon various outcomes, including knowledge, attitudes, skills, and sexual behaviors. This paper does not attempt to address the impact of programs upon intravenous drug use.

Preferably, this review should focus primarily upon the impact of AIDS education. However, the national concern about AIDS among young people is a relatively recent phenomenon, and thus very few AIDS education programs have been both implemented and evaluated. This will change, for some of the many AIDS education programs being developed are (or will be) evaluated.

In the meantime, it is worthwhile to examine the effectiveness of sex education programs which often include many of the same goals as AIDS education programs, e.g., to delay sexual intercourse, to reduce the number of sexual partners, and to increase the use of methods of birth control such as condoms. Moreover, many of the skills such as decision-making and communication skills that sex educators teach are the same skills that some AIDS educators believe should be taught to reduce the transmission of HIV.

This review focuses upon school-age youth, particularly high school students and younger. Studies of college students or other adults are included only when they have significance for programs for younger youths. Moreover, this review focuses upon programs for the general youth population, not upon special programs for high-risk groups.

Effects of AIDS Education

Thus far, the evaluations of AIDS education programs in schools have focused upon changes in knowledge and attitudes. A study by DiClemente and others (1987) evaluated the impact of a 3-hour AIDS program taught in San Francisco middle and high schools. Knowledge tests administered immediately before and after the course demonstrated a substantial (and statistically significant) increase in knowledge--the mean number of correct answers increased from 31.4 to 36.0 (out of 42 questions). Moreover, the percentage of students knowing that using condoms during intercourse is one way to help prevent the spread of AIDS increased from 70% to 87%. Similarly, the percentage of students incorrectly believing that various forms of casual contact would lead to AIDS decreased. In contrast, there was not a significant change in the mean scores for the control group.

By using a pre/post test design, this study maximized the potential for finding an impact. Because effects of programs generally diminish with time, a delayed posttest administered a month or so later might have shown less significant results.

Miller and Downer (1987) obtained similar findings in a study of a 50-minute AIDS program taught to Seattle high school students. In that school 114 students completed a knowledge and attitude questionnaire one month prior

to the instruction and one week after the instruction; 53 of these students completed a delayed posttest eight weeks after the instruction. A comparison of the pretest and posttest scores indicated that knowledge test scores increased from 78% to 90% and "tolerant and understanding" attitudes toward people with AIDS increased from 59% to 73%. These changes were statistically significant. The percentage of students who thought they might get AIDS decreased, but not significantly.

Effects of Sexuality Education

Impact upon Knowledge

Numerous studies of junior high school and especially high school sexuality education classes have measured the impact of these courses upon the knowledge of the students. Their findings are nearly unanimous--instruction in sex education does increase factual knowledge about sexuality (Angrist, Mikelsen, and Penna, 1976; Bardis, 1963; Bernard, 1973; Brann et al., 1979; Coates, 1970; Crosby, 1971; Davidow, 1976; Finkel and Finkel, 1975; Garrard, Vaitkus, and Held, 1976; Gunderson and McCary, 1980; Herold, Eastwood, and Empringham, 1973; Hoch, 1971; Kapp, Taylor, and Edwards, 1980; Kolesnik, 1970; Lamberti and Chapel, 1977; Mims, Brown, and Lubow, 1976; Parcel, Luttman, and Meyers, 1979; Thomas et al., 1985; Vacalis, Hill, and Gray, 1979). Similarly, separate units on sexually transmitted diseases (STD) increase knowledge about STD (Yarber, 1986). In some cases, the increases in knowledge were quite small; in other cases, quite large. There is some evidence that younger students with less knowledge about sexuality learn more than older students,

who may already be more informed. However, in general, the major conclusion is that there appears to be nothing exceptional about sexuality that prohibits students from learning factual material and gaining insight.

Because most of these studies are based upon quasi-experimental designs, their evidence appears quite persuasive. However, the methodological limitations of these studies should be remembered. In particular, the programs evaluated may not be representative of all programs. Second, long term effects were less commonly evaluated, and of course people do forget most any type of instructional material over time. Third, many of these programs were evaluated by the teachers themselves, and were based upon tests that they created and not upon standardized tests. Thus, the questions that they included on their knowledge tests may have reflected the facts they emphasized in class and the increases in knowledge test scores may exaggerate the increases in other areas of knowledge about sexuality.

Impact upon Attitudes

One major study has examined the impact of STD education upon attitudes (Yarber, 1986). That study evaluated an innovative program that was implemented in six school districts and that was specifically designed to affect knowledge, beliefs, feelings, and behaviors relevant to preventing and treating sexually transmitted disease. It did not evaluate actual behavior, but did evaluate behavioral intentions. The research demonstrated that beliefs and feelings about healthy behaviors improved significantly and remained improved until the 6-week delayed posttest. Intentions to engage in healthy behaviors also improved, but not as much and after six weeks were not substantially different from before the program.

A variety of studies have examined the impact of sexuality education upon a wide range of attitudes, such as attitudes toward premarital sexual activities, perceived probability of getting pregnant, perceived cost of having a child, attitudes toward the importance of birth control, concern about sexually transmitted diseases, attitude toward masturbation, clarity of personal sexual values, and acceptance of sexual practices of others. However, these studies provide very mixed results. Some of them indicate that the courses had a small impact upon the students, while others do not. Moreover, changes in attitudes that may have taken place are also mixed, reflecting the wide variety of goals that instructors have had for their courses during the last decades.

During the late 1970's, several studies included courses that were designed to make students more tolerant of the sexual practices of others (e.g., masturbation, premarital sex, and homosexuality). A few studies indicate that these courses were successful in that endeavor (e.g., Parcel, Luttman, and Meyers, 1979; Hoch, 1971). However, those courses seem to have had little impact upon the beliefs that students had about their own sexual behavior. Moreover, one should not generalize from this evidence for several reasons: several of the studies were based upon small sample sizes; few examined long term effects; and a few produced results that contradicted each other.

In a study of fourteen sex education programs, Kirby (1984) found that six courses increased the clarity of students' values, while the others did not. Moreover, most of the programs did not have measurable effects upon self esteem; satisfaction with social and sexual relationships; or attitudes toward birth control, gender roles, and sexuality in life. With one exception, the programs also did not have a measurable impact upon comfort with a variety of

social and sexual activities. The one exception was a parent/child program that brought parents and their children together and actually had the parents and their adolescents communicate with each other in the classroom about sexuality. As a result, they were also more comfortable talking about sex after the course was over.

Finkel and Finkel (1975) found significant changes in high school students' perceptions of personal responsibility for their own behavior and in attitudes toward gender roles. They also found other changes that were in the desired direction, but not statistically significant. At least one other study (Hoch, 1971) found that sex education programs did make students more accepting about contraception and family planning.

During the last few years, a variety of youth-serving organizations (e.g., Girls Clubs and Boys Clubs) and schools have developed programs to help teens say "no" to sexual activity. Preliminary unpublished data from a few evaluations of these programs have indicated that the programs may temporarily help younger teens have a more positive attitude about saying "no" and delaying sexual activity.

The preliminary results of these last studies should be viewed with considerable caution for several reasons: they are not yet published in professional journals; the studies sometimes did not measure long term effects; response biases may be affecting post-test scores; and the programs are commonly not evaluated by independent researchers.

Impact Upon Skills

The same study by Kirby (1984) also examined the impact of the longer, more comprehensive sexuality education classes upon skills to make decisions about social and sexual situations and skills to communicate feelings about

sexuality and the use of birth control. Again, that study did not find a measurable impact on skills, even in those comprehensive courses which devoted considerable time to teaching and practicing those skills.

However, the study measured skills by asking questions on the actual practice of these skills during everyday life outside the classroom. Thus, the students may have learned skills without continuing to practice them in their social interaction outside the classroom. During a classroom discussion, one student even asserted that it was difficult to transfer those skills to the real world outside. Moreover, measuring the actual practice of decision-making and communication skills outside the classroom is very difficult and fraught with methodological problems. Although the questions had a reasonably high reliability, they may not have had a reasonably high validity.

In contrast, Schinke, Blythe, and Gilchrist (1981) did develop an intensive cognitive-behavioral training that produced a measurable impact upon skills. The 14-part course taught communication skills through modeling, role playing, and rehearsal. During the classes students acted as one another's antagonists, coaches, and feedback sources as they practiced communicating contraceptive decisions. To measure skills, the research staff video-taped responses to stressful vignettes. Their analysis demonstrated that the participants did have better eye contact, were more likely to make a declarative "no" in response to social pressure, were more willing to refuse to risk getting pregnant, and were more willing to share responsibility for birth control.

This study appears to have reliably and validly measured both decisionmaking and communication skills. On the other hand, it is difficult to generalize from this study, because only 18 students participated in the

course. Moreover, it is not clear from the research whether there were a variety of measured skills that did not improve. Nevertheless, this behavioral-cognitive program represents a promising approach that may, in fact, have an impact upon skills, and despite the small number of subjects in this research, the program appears to be replicable. Moreover, if the sample size had been larger, additional outcomes might have significantly improved.

Impact Upon Behavior--Sexual Activity, Use of Birth Control, and Pregnancy

There are three major studies which have carefully examined the impact of sexuality education upon behavior. All three are national studies involving more than one sexuality education program, large sample sizes, questions about behavior, and some method of determining the temporal order of participating in a program and engaging in subsequent behavior.

The first study is the one mentioned above that evaluated the impact of fourteen exemplary sexuality education programs offered by eight different organizations and taught by highly trained teachers (Kirby, 1984). The courses included a wide variety of popular approaches to sexuality education: short courses lasting 6 to 10 days, all-day conferences, and semester or year-long courses; courses offering primarily the basics and seminars providing more in-depth coverage; separate courses and units integrated into other classes; courses for high school students and courses for junior high or elementary school students; courses for students alone and courses for students and parents together; courses taught by adult professionals, and courses taught by peers; courses taught by schools and courses taught by community mental health centers or family planning clinics, either in schools or elsewhere; and finally, courses located throughout the country for Whites,

Blacks, and Hispanics. Although the selected courses represent a wide variety of approaches, they were all perceived as exemplary examples of those approaches by leaders in the field, were commonly taught by experienced professionals in the field, covered all the basic topics in sexuality, and used a variety of different teaching approaches (including didactic presentations, group discussions, role playing, films, and structured exercises).

The study used primarily a quasi-experimental design. At all sites, students in the sexuality education classes completed pretest and posttest questionnaires. In some of those sites, they also completed second posttest questionnaires three to five months after the end of the program. At none of the sites was it possible to randomly assign adolescents to sexuality classes (experimental groups) and other classes (control groups). However, at several sites, similar students in other classes completed questionnaires and served as control groups. Each of the sexuality classes was then matched with one or more of the most similar control groups. (When using more than one control group, the major conclusions were nearly always the same regardless of which control group was used.)

In all classes, nearly all the students completed the questionnaires. Thus, the analysis was based upon data from more than 2,000 students.

This study found that none of the sexuality courses had a measurable impact upon whether or not the participants had ever had sex or had engaged in sex the month prior to the pretests or posttests, nor upon the number of times they had engaged in sex during the prior month. In short, the courses did not appear to affect the incidence of sexual intercourse.

In 11 of the 14 courses it was possible to measure the impact of the courses upon contraceptive use. In some cases, the impact up to five months after the end of the courses was measured. None of the courses had any

measurable impact upon 1) the frequency of sexual intercourse without any method of birth control, 2) the frequency of intercourse with relatively ineffective methods of birth control (such as withdrawal), or 3) the frequency of intercourse with relatively effective methods of birth control (such as condoms or the pill). The results were the same when courses were analyzed both separately and together (in order to increase the sample sizes).

Although the design and questionnaire of this study were carefully constructed to evaluate the impact of the programs, this study also had limitations. Four were particularly important: 1) exemplary courses were evaluated, not randomly selected courses throughout the country; 2) students could not be randomly assigned to experimental and control groups; 3) the samples sizes for each type of program were rarely more than a few hundred and thus could not detect small effects; and 4) the long-term effects of the programs could not be measured.

The second study is based upon the 1984 National Longitudinal Survey of Work Experience of Youth (Marsiglio and Mott, 1986). In 1979 the first round of the survey was conducted with a nationally representative sample of 6,288 women and 6,398 men aged 14 to 22. The same respondents were reinterviewed each year thereafter. The actual analysis is based upon the 6,015 women and 6,054 men interviewed in 1984. At that time they were 19-27 years old. Thus, this sample is very large; it is nationally representative; and it is longitudinal and can determine the relative ordering of events.

The survey questionnaire included questions about whether that respondent had taken a sex education course and whether that course discussed the menstrual cycle, types of contraception, and sexually transmitted disease. Thus, this study measured participation in the wide range of sex education programs that are offered throughout the country. Many of these programs undoubtedly included only a few lectures.

The study used multivariate logit analysis to statistically control for background characteristics, such as region of the country, urbanicity, race, economic status, religious background, and parental education. By controlling for those background variables, the study attempted to control for the fact that sex education programs might be more commonly located in high risk schools. Although these are appropriate variables to control in the analyses, it is rarely, if ever, possible in survey research to control statistically for all possible confounding variables. The results reported below are based upon the logit analyses.

Among females when they were age 14 or 15, having had a sex education course was slightly (but significantly) related to initiating sexual activity during the following year. Among females when they were age 16 or 17, there was no such relationship.

The analysis of the relationship between sex education and recent use of birth control produced mixed results. Simple percentages with breakdowns for each race do show a positive and significant relationship between sex education and recent use of birth control for Whites, but not for Blacks or Hispanics. Obviously, these percentages fail to control for a variety of other important background variables.

The multivariate logit analysis did show a positive and significant relationship between sex education and recent use of birth control. However, when sex education was defined as including any of three topics about contraception, the logit analysis produced positive, but NOT statistically significant results. That is, according to the logit analysis, sex education which included birth control was not significantly related to recent use of birth control.

Among all the females, there was no significant relationship between having had sex education and having been pregnant, even when a variety of models were explored, controlling for different variables.

In sum, this study indicates that taking a sex education course may slightly increase sexual activity among younger teens, but not among older teens, may or may not increase the use of birth control, and does not have an impact on pregnancy.

The fact that this study examines the impact of a cross-section of American sex education programs is both a strength and a weakness. On the one hand, it does provide important information about the impact of sex education as it is taught throughout this country. On the other hand, many sex education programs are rather short and limited, and this study provides no indication of the effectiveness of more comprehensive programs which are more likely to produce results or of special more innovative programs with particularly promising approaches.

The third study is also based upon a national survey, this time upon the 1982 National Survey of Family Growth (Dawson, 1986). The sample consisted of 1,888 women aged 15 to 19. The sample was not longitudinal, but did ask whether and in what year the respondents had received sex education and contraceptive education and whether and in what year they had initiated sexual activity. Thus, the temporal ordering of events could be determined whenever they took place in separate years. However, when the respondents took sexuality education and initiated sex in the same year, the ordering could not be determined. This was true of 10% of the respondents who took sex education. Thus, the data were analyzed assuming that when both events took place in the same year initiation of sex took place first; then the data were reanalyzed assuming that sexuality education took place first.

This study also employed a multivariate logit analysis and statistically controlled for region, race, income, parents education, number of parents lived with at age 14, religious experience, and urbanicity.

Given the first assumption above that sex occurred prior to sex education when in the same year, sex education was unrelated to initiating sex during the following year for any of the teenagers, regardless of age. Given the assumption that sex followed sex education, sex education was related to initiation of sex for 14-year-olds, but not for 15, 16, 17, or 18-year olds.

When examining the relationship between sex education and use of birth control, this study also analyzed simple percentages first. It found that students who had received pregnancy and contraceptive education were much more likely to have used birth control the first time they had sex (69% versus 52%), much more likely to have ever used contraception (86% versus 70%), but only slightly more likely to currently use contraception (62% versus 58%). These differences should be viewed with caution, because they do not control for any variables--not even race or age--which can produce spurious relationships.

The study also applied a multivariate logit analysis to the relationship between sex education and the use of birth control. These results indicate that having taken pregnancy and contraceptive education was positively related to use of birth control during first coitus when sex education did take place prior to the initiation of sex, and pregnancy and contraceptive education was also positively related to ever use of birth control. However, pregnancy and contraceptive education was not related to current use. Thus, this more sophisticated logit analysis confirmed the simple percentages.

Finally, this study also found that sex education was not significantly related to pregnancy.

This study has the same limitations as that by Marsiglio and Mott. In addition, the temporal ordering of events was less certain, partly because they were based upon recall and partly because the ordering could not be determined when they occurred within the same year.

Several other studies based upon national surveys have examined the impact of sexuality education. However, their conclusions are less compelling because they are based upon cross sectional data with no capability of determining the temporal ordering of events. Moreover, they used less sophisticated statistical methods and did not statistically control for as many background characteristics.

Zelnik and Kim (1982) analyzed data from two national surveys of teenagers in this country. The first survey, collected in 1976, was a nationally representative sample of young women aged 15-19, while the second survey, completed in 1979, was a nationally representative sample of young women aged 15-19 and young men aged 17-21 living in households in Standard Metropolitan Statistical Areas.

Like the surveys above, both of these surveys asked whether the respondent had been in a sex education class, and if so, whether it included information on contraceptive methods.

Zelnik and Kim controlled for the effects of age and race by dividing the samples into categories by race and age (15-17 and 18-19 for females, and 17-18 and 19-21 for males) and statistically analyzing the relationship between having had sex education and having had sex within each of these groups. Although they conducted a variety of analyses, they found no consistent and statistically significant relationship between sex education and having initiated sex.

Zelnik and Kim also used their survey data to analyze the relationship between having had sex education on the one hand, and on the other hand, having used any method of birth control and having used a prescription method during first intercourse and during any act of intercourse. They again controlled for age and race by dividing the sample into subgroups, but this time they analyzed only women. Their results were definitely mixed--in some age and racial groups those who had received sex education were more likely to have used any method or a prescribed method of birth control at first or any intercourse, while for other groups, those who had not had sex education were more likely to have used birth control. In 26 of the 32 possible comparisons, the differences between those who had ever taken sex education and those who had not had sex education were not statistically significant. For those 6 differences that were statistically significant, the results all indicated that young women who had taken sex education were more likely to have used birth control.

Zelnik and Kim also examined the relationship between sexuality education and pregnancy. They found that among 7 of the 8 groups of women, the differences in pregnancy rates, between those who had taken sex education and those who had not, were not statistically significant. In the eighth group the difference was statistically significant, and when all 8 groups were combined (and the sample sizes increased), the difference was statistically significant. In all 8 groups, those who had received sex education were less likely to have become pregnant.

This study has the same limitations as the national surveys described above. In addition, it cannot determine whether sexual activity or sex education occurred first and it failed to control for any background characteristics other than age, race, and sex.

A study by Furstenberg, Moore, and Peterson used similar methods, but based its analysis upon 500 15 and 16 year olds sampled in the National Survey of Children in 1981. It found a negative association between sex education and sexual intercourse, even when age, race, and other background variables were controlled. That is, those adolescents who had received sex education were less likely to have initiated sexual intercourse.

The study discussed above by Schinke, Blythe and Gilchrest (1981) also conducted a six-month follow-up and found that participants in the course were more likely than those in the control group to have always used birth control, more likely to have used it during last intercourse, and less likely to have used inadequate methods of birth control. Again, the generalizability of these findings should be questioned because it is based upon only 18 course participants and 18 control subjects.

A different type of educational approach was utilized by Vincent, Clearie, and Schluchter (1987). They implemented a comprehensive, community-wide program that involved parents, churches, schools, the media, and other community organizations in a rural county in South Carolina. That is, the program was both a school and community education program. The program did have traditional sex education objectives: to increase knowledge; to align personal values with those of the family, church, and community; to improve self esteem; and to improve decision-making and communication skills.

The authors evaluated the program by measuring the pregnancy rates for females 14-17 years old for two years before the program was implemented and three years after. Remarkably the pregnancy rates did drop by more than half. These results were statistically significant.

Although this study has produced some of the most encouraging and dramatic data for any educational program in the area, it does have limitations. First, the program was implemented in a very rural county with a

small population. In fact, there were only about 325 females 14 to 17 in the targeted area. Second, although these results are statistically significant, pregnancy rates are known to fluctuate considerably from year to year, especially when the population is small. Third, it is not clear why the program worked. Was one component more effective than another? Was it the combination and integration of all the components at once? Or was it for some other reason? Finally, it is not clear if teens delayed sex or increased their use of birth control.

A few of the abstinence or "saying no" programs around the country are currently being evaluated. A few of them which are designed for junior high school students, which involve peers, or which employ a skill-building approach have reported preliminary and unpublished results which suggest that they may slightly delay the initiation of sexual intercourse, especially among very young females.

However, once again, these studies should be viewed with considerable caution for the reasons given above: they are not yet published in professional journals; they sometimes do not measure long term effects; response biases may be affecting post-test scores; and they are commonly not evaluated by independent researchers.

Before completing these summaries of different studies, it should be recognized that a number of people, especially opponents of sexuality education, have employed a different kind of analysis using annual statistics over time. They have recognized that during the 1970's there was an increase in sex education in this country and a concomitant increase in teenage sexual behavior and pregnancy. Indeed, these changes did take place.

However, opponents commonly attribute the increase in sexual behavior and pregnancy rates to sex education, and this attribution of causality should be critically questioned. As has been widely reported in many popular

journals, many changes took place during the 1970's that may have increased teenage sexual intercourse. For example, several factors may have contributed to a sexual revolution among young adults: 1) many young women decided to obtain more education, to seek better jobs, to delay marriage, and therefore not to wait until marriage to have sex; 2) the increasing availability and use of contraception reduced the probability of pregnancy when having sex; 3) the increasing availability of abortion may have reduced the perceived cost of pregnancy for many women; and 4) the general media and culture presented many more sexual messages. Some or all of these factors, as well as other factors, are much more likely to have contributed to the increase in sexual activity among teenagers than sex education programs. Thus, one should not conclude from these time series data that sex education increased sexual activity.

Discussion

These studies overwhelming demonstrate that sexuality education programs can increase knowledge, and a few studies indicate that at least some of this information is retained for a long time. The two studies of AIDS programs demonstrate a similar increase in knowledge. Most of the research on sex education also suggests that most courses have little measurable impact upon attitudes, although there are occasional exceptions--a few courses which have as their explicit goals particular attitudinal changes may have a small impact upon those specific attitudes. Few studies have been able to measure skills adequately--one study based upon a very small sample and employing excellent measurement techniques did find changes in skills, while another study based upon larger samples and employing less valid methods of measurement found no change. Most studies found that sex education programs did not have an

impact upon sexual intercourse, either initiation or subsequent frequency. However, one major national study did find that among younger teenage females, sex education was associated with subsequent initiation of intercourse. In contrast, other national surveys have not found any such relationship. Moreover, preliminary findings from an evaluation of at least one program specifically designed to delay sexual activity suggest that the program may have succeeded in that effort.

Research based on one large national survey found that sex education was significantly related to current use of birth control, but that sex education that included contraceptive education was not so related. Research based on a second large national survey also found that pregnancy and contraceptive education was not significantly related to current use, but was related to use of birth control during first intercourse and to ever using birth control. An analysis of a third national survey produced mixed results for the impact of sex education upon current use, but the preponderance of the data suggested some impact upon current use. Finally, a national study that evaluated exemplary programs and employed quasi-experimental designs did not find any measurable impact upon current use of birth control. In sum, these studies suggest that sex education may have a modest impact upon use of birth control during the first episode of sexual intercourse, and upon ever using it, but not upon current use.

Finally, none of the three major studies found a measurable impact upon the incidence of pregnancy.

Behavioral Effects of Other Educational Programs

The findings of these studies of sexuality education are remarkably consistent with studies of other kinds of educational programs designed to improve healthy behaviors. Although there is variation among the many

research findings in different fields, many of the better studies typically found that educational programs can effectively increase knowledge, but have relatively little success with altering most attitudes, psychological attributes, and behavior. For example, several studies of units on nutrition often indicated that such units increase knowledge of nutrition, but do not significantly change eating habits (Byrd-Bredbener et al., 1984; Lovett, Baker, and Marcus, 1970; Baysen and Ahrens, 1972; Showic and Jennings, 1979; and Bell and Lamb, 1977). Similarly, driver's education increases knowledge, but does not measurably reduce automobile accidents among teenagers even when the age at which teenagers begin driving are legally or statistically controlled (Robertson, 1980). Finally, several reviews of drug education programs indicated that those programs have little impact upon substance abuse (Berberian et al.,1976; Kinder, Paper, and Walfish, 1980; Schapps et al., 1981; Viadero, 1986). Fortunately, there are a few exceptions--some anti-smoking programs for young adolescents help them delay or refrain from smoking, and a few drug education programs, particularly those that focus upon skills have had some success (Botvin, 1986; Flay, 1985). These success do suggest the importance of understanding more clearly why they were more successful, of developing a better theoretical understanding of success, and of developing and evaluating programs based upon this theory.

Limited Impact of Knowledge

These findings and the findings of the impact of sex education programs raise an important question: If the programs increased knowledge, why did not they have a greater impact upon behavior? The answer is partially that additional knowledge, in general, does not have much impact upon behavior. In other fields, a variety of scholars have examined this relationship. There is

the old, but classic study (Turner, 1943) of 15,480 adolescents in Massachusetts which found no relationship between numerous health habits and health knowledge related to each of those health habits. For example, young people who were more knowledgeable about brushing their teeth were neither less likely nor more likely to brush their teeth. Other more recent studies have also found that knowledge about nutrition is either weakly or insignificantly related to nutritional habits (Byrd-Bredbener et al., 1984; Lovett, Baker, and Marcus, 1970; Baysen and Ahrens, 1972; Showic and Jennings, 1979; Bell and Lamb, 1977; Schwartz, 1975).

In the area of adolescent sexuality, similar results have been reported. When Chilman (1979) reviewed numerous studies on adolescent sexuality, she found "that there is little, if any, relationship between levels of measured knowledge and contraceptive behavior." (p. 171). In an analysis of 600 high school juniors in the same school, Kirby (1985) found that students who were more knowledgeable about the probability of becoming pregnant were neither less nor more likely to have unprotected intercourse than those students who were less knowledgeable. Similarly, students who were more knowledgeable about birth control were neither more likely nor less likely to use birth control.

There are a variety of reasons why increases in knowledge from educational programs have limited impact upon behavior. First, many programs produce only modest increases in knowledge when those increases are measured by standardized tests. Moreover, those increases diminish with time. And, after all, most teenagers do have other sources of information about sexuality. Most students do know the basic facts about sexuality even before they take a sexuality education class--most do know that sexual intercourse can lead to pregnancy, and most students have heard of and know where to get the most popular forms of birth control, such as condoms and pills.

Second, many young people seem not to apply their knowledge to their own behavior. This explanation is supported by a study by Namerow (1984) of 406 adolescents using The Door, a program for adolescents in New York City. She found that adolescents who could better answer three knowledge questions about the timing of ovulation and pregnancy were not more likely to assess accurately the probability of their becoming pregnant during their last act of intercourse. Further evidence that teenagers do not personalize information is that a very common explanation given by teenagers for having unprotected sex is that they just did not think they would get pregnant, even when they knew the facts of life.

Third, many sexually active young people do not have sex very often. Thus, another common reason that they give for having sex without birth control is that they just did not expect to have sex.

Fourth, increasing knowledge about sex, pregnancy, and birth control will not necessarily increase perceptions of risk nor reduce risk-taking behavior, even when teenagers know they will have sex. In fact, in Namerow's study, the largest group of teenagers consisted of those who incorrectly thought they might get pregnant during their last act of intercourse when their monthly cycle indicated they were actually not at risk. Moreover, this group was three times as large as the group of risk-takers who incorrectly thought they could not get pregnant when they actually were at risk. The first group was also more likely than any other group to use birth control. These findings suggest that ignorance about whether they were actually at risk did not increase their risk-taking and might actually have decreased it. That is, because they did not know whether or not they would get pregnant, they used birth control to prevent possible pregnancy.

Fifth, there are many important factors other than knowledge which affect teenage sexual and contraceptive behavior. Over many years, teenagers are socialized by parents and peers and exposed to television, radio, rock idols, rock music, etc. They are also affected by practical factors such as the availability of sexual partners and birth control. In addition, their behavior is affected by a myriad of internal factors: physical development and sexual desires; physical attractiveness; the desire to attract a boyfriend or girlfriend and the fear of losing one; emotional needs for affection and physical contact; the clarity of values and needs; skills in expressing those needs; ego strength; plans for the future; perceived ability to control one's own future; attitudes toward parents and society; and, of course, the desire to have or not to have a baby. Given all these factors, one would not expect a small amount of additional information about sexuality to have much impact upon behavior.

Implications for AIDS Education

The extent to which research on sexuality education and STD education can be generalized to AIDS education depends at least partly upon what teenagers already know about AIDS and partly upon their fear of getting AIDS. After all, their fear of getting pregnant (or getting someone else pregnant) or their fear of getting a curable sexually transmitted disease may have much less of an impact on their sexual behavior than the fear of dying from AIDS. On the other hand, if teenagers do not believe that their sexual partners might have the HIV virus and if they don't believe that they are personally at risk of getting the HIV virus, then the fear of AIDS (or the absence of that

fear) may not have an impact upon their behavior. Consequently, it is worthwhile to examine what adolescents already know about AIDS, how much they fear getting AIDS, and the link between knowledge and fear.

Several studies of different age groups have demonstrated that people in the U.S. are already quite knowledgeable about AIDS--particularly that vaginal and anal intercourse with an infected partner can transmit the HIV virus. Questions about AIDS were included in the National Health Interview Survey (Dawson, Cynamon, and Fitti, 1987). Remarkably 98% of the population believed that it was definitely true or probably true that AIDS leads to death; 92% believed that it was definitely or probably true that the AIDS virus can be transmitted through sexual intercourse. These percentages were even slightly higher for respondents aged 18 to 29. Other data also demonstrated considerable knowledge about other aspects of AIDS.

Surveys of adolescents are not national, but provide similar results. Before receiving instruction on AIDS, students in a Seattle high school were very knowledgeable about the basic facts and causes of AIDS: 92% knew there was no known cure for AIDS; 85% knew that people could have the HIV virus in their body without being sick; 96% knew that people can get infected with the HIV virus by shooting drugs with a used needle; and finally, 96% knew that people can get infected by having sex (Miller and Downer, 1987).

In contrast, the students were much less likely to know that certain activities are not likely to transmit the HIV virus. For example, comparatively low percentages of students knew that people would not get the HIV virus from giving blood at the blood bank (57%), being bitten by a mosquito (53%), or eating from the same dishes (74%). Thus, these students did correctly know that certain activities could lead to infection with the AIDS virus, but not all of them knew that other activities would most probably

not spread the AIDS virus. Along with the additional knowledge gained during the AIDS instruction there was a small decrease in the students' fear of getting AIDS, but this decrease was not statistically significant.

A random telephone survey of adolescents in Massachusetts revealed that 98% knew that anal intercourse could transmit the HIV virus and 92% knew that vaginal intercourse could transmit the virus (Strunin and Hingson, 1987). Much lower percentages of adolescents knew that other social or sexual behaviors did not transmit the virus that causes AIDS. Even in 1985--three years ago and before the massive publicity in the media--a survey of adolescents in San Francisco found that 92% of the high school students knew that sexual intercourse could transmit the HIV virus (DiClemente, Zorn, and Temoshok, 1986). However, at that time only 60% of the students knew that condoms reduced the risk of transmitting the AIDS virus during sexual intercourse. Finally, three studies of colleges in the midwest (McDermott et al., 1987), Louisiana (Atkinson, Ktsanes, and Hassig, 1987) and Maryland (Freimuth, Edgar, and Hammond, 1987) all demonstrated that college students had considerable knowledge about AIDS.

According to the Seattle survey and all three college studies, television, newspapers, and magazines were the most important sources of knowledge, although in at least one of these studies, schools became the most important source of information after formal instruction in school took place.

In the 1985 San Francisco survey of Black and Latino adolescents, the data indicated that more knowledge about AIDS was associated with a lower perceived risk of contracting AIDS (DiClemente, Boyer, and Morales, 1988). This probably reflects a pattern in which those who are more knowledgeable about AIDS are more aware that they will not contract AIDS from casual contact with other people.

The Massachusetts study also indicated that only 15% of the sexually active students had changed their behaviors because of AIDS. Mostly they were "more selective of their partners" or more "careful." Only 1.5% used condoms and only 1.5% avoided sex because of AIDS.

The studies at Louisiana and Maryland indicated that larger percentages of college students had changed their behavior because of the fear of AIDS. For example, at Louisiana, 59% of the students said that fear of AIDS had affected the number and their choice of sexual partners. At the University of Maryland a survey of 458 revealed the following: of 27 students who had ever had sex with prostitutes, 37% decreased that behavior; of 292 students who had ever used condoms, 30% increased that behavior; of 63 students who had ever had anal sex, 27% decreased that behavior (Freimuth, Edgar, and Hammond, 1987).

However, it is also important to realize that in both of these studies, the majority of students continued to practice unsafe sex. Similarly, in a study at Stanford University (Chervin and Martinez, 1987), only 20% of females and 30 percent of the males practiced safer sex behaviors.

These studies are enlightening in several respects. Presumably, these students would not have changed their behavior because of AIDS if they had known nothing about AIDS. Thus, one can logically assume that knowledge about AIDS did, in fact, affect their behaviors.

However, these students had high levels of knowledge about AIDS--particularly heterosexual transmission--even without special educational programs. And just as additional knowledge about sexuality and pregnancy may not have much impact upon sexual or contraceptive behaviors to prevent pregnancy, so additional knowledge about AIDS may not have much impact upon behaviors to prevent AIDS.

Furthermore, the primary reasons that teenagers give for having sex and not using birth control to prevent pregnancy would probably also apply to their having sex and not using birth control to prevent AIDS. The major reasons are 1) they did not expect to have sex, 2) they did not think the girl would get pregnant, 3) they did not think pregnancy would happen to them.

Obviously, the fact that many teens find themselves in situations where they want to have sex (or are pressured to have sex), but are not prepared to have sex, and do so anyway, will continue to limit the effectiveness of AIDS educational programs. However, it may be a more important factor for pregnancy than for AIDS for the following reason: Teenagers who have unprotected sex because they did not expect to have sex are commonly those teenagers who have had sex a smaller number of times--they have not yet fully accepted the fact that they are sexually active. This fact does not help prevent pregnancy, but it does help reduce the transmission of AIDS because they are less likely to give someone else AIDS if they themselves are less likely to have the HIV virus because they have had sex only a small number of times.

The second common reason for unprotected sex does apply to the effectiveness of AIDS education. Numerous people have written about and/or documented the perception of invulnerability that teenagers have (c.f. Freimuth, Edgar, and Hammond, 1987; O'Donnell and Kodama, 1987). In general, teenagers do not personalize the risk--they do not think that unfortunate events will happen to them.

This is especially likely to characterize their concerns about AIDS. In reality, for most teenagers the probability of having sex with someone infected with the HIV virus is quite small, and the probability of their actually contracting HIV from that person is still smaller. Because

teenagers, like adults, have difficulty making decisions when probabilities are very small, they are less likely to change their behavior, even when they have been given accurate information.

This is especially likely given that many young people who have not been exposed to an educational program overestimate the number of cases of AIDS in this country and overestimate the chances of getting AIDS from a single unprotected act of heterosexual intercourse (Freimuth, Edgar, and Hammond, 1987). Thus, exposure to more correct estimates may logically reduce their concern, not increase it.

Regardless of their estimates of the number of AIDS cases, young people do not believe that they are at risk. In the University of Maryland study, more than 75% of the students rated their risk at the lowest end of a 6-point risk continuum. Moreover, more than 80% estimated their chance of exposure to AIDS at either 0% or 10% (Freimuth, Edgar, and Hammond, 1987). A review of 23 public opinion polls of adults also revealed that few adults view AIDS as a threat to their own health (Singer, Rogers, and Corcoran, 1987).

Indeed, many young people will not treat the threat of AIDS seriously until their reality and their environment reinforces the facts they hear on the media or from educators. That is, they may not dramatically change their behavior until some of their friends or peers have symptoms of AIDS.

Promising Strategies

The research reviewed above all indicates that to be effective at reducing risk-taking behavior, AIDS education programs must do much more than simply increase knowledge. Instead, programs must help adolescents

personalize that information, improve their decisionmaking and communication skills, increase their motivation, and change their perception of peer group norms regarding having sex and using condoms.

There does not yet exist a body of evidence to demonstrate that any particular educational strategy is effective and sufficient. However, there are some promising approaches with some evidence for their success.

At least one study (Schinke, Blythe, and Gilchrest, 1981) has indicated that programs which personalize the information and use role playing extensively to teach skills and possibly reinforce particular norms may be effective. This role playing of particular skills needs to be situationally specific. For example, the teacher needs to model and the students need to practice how to discuss the threat of AIDS without offending the partner, how to say "no" to sex, how to refrain from having sex when condoms are not available, and how to insist upon the use of condoms when having sex.

Some professionals in the field have suggested that programs may be more effective if the adolescents, themselves, play a major role in the programs and accept some responsibility for the effectiveness of the programs (Cooper and Bye, 1988). Adolescents not only can help shape the program, they can also design materials, give presentations in classrooms, write letters to the school newspaper, conduct surveys of risk-taking behaviors, and serve as role models for responsible behavior. When many student leaders openly and consistently express norms against risk-taking behavior, school-wide norms may, in fact, change.

Another promising approach involves community wide strategies which are both multi-faceted and mutually reinforcing. In addition to involving schools, such programs can include parents, radio and television stations, newspapers, churches, youth-serving agencies, family planning agencies, and

other community groups or organizations. School programs are much more likely to be effective if the norms expressed in those programs are supported and reenforced by the larger social environment.

If educational approaches are going to be implemented in schools, then it is important that they be implemented in elementary school and middle school, as well as in high school. There are several reasons for this. First, there is some research in other health areas such as smoking which indicates that when programs are implemented earlier, they may be more effective. Second, those students who are most likely to live in high risk areas and to engage in risk taking behaviors are also more likely to drop out of school. Nationally, about 25% of young people drop out of school before high school graduation (National Center for Education Statistics, 1985), and the percentages are much higher in some communities where AIDS is likely to be more prevalent.

More generally, this raises a larger issue, namely that programs must be both age-appropriate and culturally sensitive. Clearly, what is most effective will vary with age and culture. What works for older teenagers in high risk communities may be inappropriate for younger students in low risk communities.

Conclusions

This review of the many studies on sex education and the few studies of AIDS education clearly demonstrates that AIDS education can increase students' knowledge. The evidence for this, particularly in sex education, is overwhelming. Moreover, a few studies of sex education programs indicate they may slightly increase early use of birth control, and a few studies of AIDS

education programs indicate that such programs may effectively reduce adolescents' fear of contracting the AIDS virus from casual social interaction. However, a critical question is whether the greater knowledge gained from AIDS educational programs will reduce risk-taking behaviors.

On the one hand, knowledge must play an important role--if young people do not know about AIDS, then the threat of AIDS cannot affect their behavior, and research already shows that some teenagers, particularly college youth claim that they have already changed some of their behaviors. Moreover, there is compelling evidence that adult homosexual men have dramatically changed their behavior (Coates, Stall, and Hoff, 1987). Furthermore, among teenagers, greater knowledge may have an unmeasurab' but nevertheless important impact in the long run. Clearly, having some information about AIDS is essential to avoiding risk-taking behaviors.

On the other hand, preliminary studies of adolescents indicate that large percentages of adolescents have already learned from television or magazines the important facts about the causes of AIDS. Moreover, a variety of studies in the area of sexuality indicate that greater knowledge about sexuality and birth control are not related to the use of birth control. In fact, two studies on knowledge about AIDS have suggested that greater knowledge may have slightly reduced students' fear of AIDS, partly because students learned that certain activities such as french kissing would probably not lead to AIDS.

All of this indicates that if AIDS education is to be effective in changing behavior, it must do far more than simply teach facts. Instead, it must teach skills and increase the motivation of young people to avoid high-risk behaviors. Perhaps it needs to change the norms that young people have about sex and use of condoms. These tasks are obviously more difficult,

requiring much more than an hour or so of instruction. The greater complexity of these tasks also suggests that AIDS instruction should be integrated with other instruction, such as sex education, which shares similar goals, and also that AIDS instruction should be integrated into much more comprehensive community-wide programs which reenforce it. Fortunately, at least one study indicates that such programs do affect behavior.

The research also indicates that programs may be more effective in high risk communities where a higher percentage of people have AIDS. In such communities, the actual risk of contracting AIDS is higher and thus represent a more serious threat to teenagers. Moreover, the teenagers are more likely to know personally someone with AIDS and thus to personalize the risk and costs of contracting AIDS.

Finally, it is abundantly clear from this review that sex education and AIDS education programs have not yet been based upon a carefully developed theoretical framework and then rigorously evaluated. Thus, there remains a need to better understand why some programs designed to improve health habits may have been effective, to more fully develop a theory on how to change adolescent risk-taking behaviors, to develop programs based upon that theory, and then to evaluate them systematically.

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